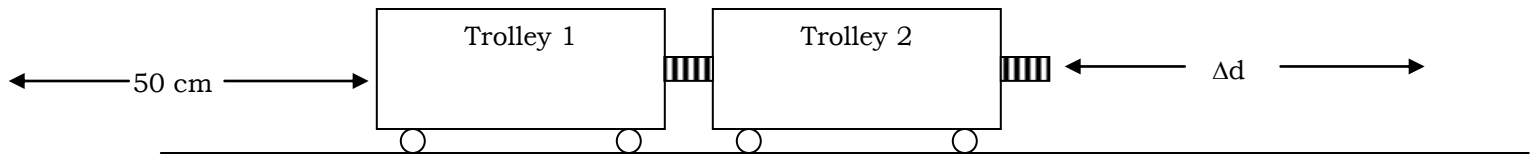


CONSERVATION OF MOMENTUM LAB



Procedure:

1. Determine the mass of the two trolleys
2. Set up the two trolleys on a flat surface with the loaded spring bumper of one touching the back of the other.
3. Using chalk, mark the location of the front end of each trolley.
4. Make a mark 50 cm away from the front end of trolley 1.
5. Release the spring bumper of the trolley
6. As the front end of trolley 1 passes over the 50 cm mark, mark the position of the front end of trolley 2. Record this distance Δd
7. Repeat steps 2-6 with masses of 1000 g and 2000 g on trolley 2.
8. Create a table that has three rows, Trial 1, 2, 3.
9. The table should include columns for mass, distance traveled and relative momentum for both trolley 1 and trolley 2 [*note relative momentum is proportional to the momentum since Δt is equal for both trolleys*]

NOTES: include in your observation calculations and discussion the total momentum before and after each collision. Include a discussion of error.

Add, as an appendix, answers to the following questions regarding momentum and collisions:

1. A 2000 kg car traveling east at 24 m/s enters an icy intersection and collides with a 3600 kg truck traveling south at 10 m/s. If they become coupled together in the collision, what is their velocity immediately after impact? [11 m/s [E 34°S]]
2. A 3000 kg space capsule is traveling in outer space with a velocity of 200 m/s. In an effort to alter its course, it fires a 25 kg projectile perpendicular to its original direction of motion at a speed of 2000 m/s. What is the new speed of the space capsule and by what angle has its direction changed? [202 m/s, 4.8 degrees].
3. A bomb, initially at rest on a smooth horizontal surface, is exploded into three pieces. Two pieces fly off horizontally at a 60 degree angle to each other. A 2.0 kg piece at 20 m/s and a 3.0 kg piece at 12 m/s [60 degrees counter clockwise from the first piece]. The third piece flies off horizontally at 30 m/s.
 - a) determine the direction of motion of the third piece. [148 deg. counter from 3 kg piece]
 - b) What is its mass? [2.2 kg]
4. In a cloud chamber experiment, a radioactive particle originally at rest disintegrates into three smaller particles. Two of these particles were detected moving in a horizontal plane velocities 8.0×10^6 m/s [N] and 1.0×10^7 m/s [E]. These pieces had masses of 5.0×10^{-26} kg and 3.0×10^{-26} kg respectively.
 - a) determine the momentum of particle 1 and particle 2. [4×10^{-19} kgm/s [N], 3×10^{-19} kgm/s [E]]
 - b) Determine the momentum (mag. & direction) of the third undetected particle. [5×10^{-19} kgm/s [S37°W]]